Claims

1. Drive element (8)

which has an inner driving profile (5) which defines a profile axis (P_I) and has on its inner side a plurality of concave, i.e. curved inwardly towards the profile axis (P_I), drive surfaces (6) which are arranged uniformly distributed around the profile axis (P_I) and between which planar or convexly curved transition surfaces (7) are provided, or

which has an outer driving profile (9) which defines a profile axis (P_A) and has on its outside a plurality of concave, i.e. curved inwardly towards the profile axis (P_I), drive surfaces (10) which are arranged distributed uniformly about the profile axis (P_A) and between which planar or convexly curved transition surfaces (7a) are provided, wherein

in cross-section, the transition points (P1) or transitions between the drive surfaces (5, 10) and the transition surfaces (7, 7a) lie on a common inner circle with the inner diameter Di, and

the drive surfaces (5) lie on outer circles of diameter Da distributed uniformly around the profile axis (P_I, P_A) and are formed symmetrically with respect to their longitudinal central plane enclosing the profile axis (P_I , P_A), **characterized in** that

the outer diameter Da and the center-to-center distance L between the centers of the outer circles and of the inner circle are selected as a function of the inner diameter D_i such that the normal force acting at the transition points between in each case one drive surface (6, 10) and the adjacent transition surface (7, 7a) when a torque M_D about the profile axis (P_I , P_A) is introduced into the drive profile (5, 9), is

tangential to the drive surface (6, 10) adjacent to the one drive surface (6, 10) or runs within the latter, i.e. is directed into the central region of the driving profile (5, 9) which is positioned between the drive surface (6, 10) and the profile axis (P_I , P_A).

2. Drive element according to claim 1, **characterized in** that the running ratio $K=D_a /D_i$ is in the range of 0.3 and 2.0.

3. Drive element according to claim 2, **characterized** in that the center-to-center distance L is calculated according to the formula $L=F(L, D_i) D_i$, where $F(L, D_i) = 0.494 e^{(0,605K)}$.

4. Drive element according to one of the previous claims, **characterized in** that it comprises an inner driving profile (5) and the drive surfaces (6) of the inner driving profile (5) are inclined with respect to the profile axis (P_a), approaching the profile axis (P_a) starting from an insertion opening (5a) of the inner driving profile (5) towards a rear end of the inner driving profile (5).

5. Drive element according to claim 4, **characterized** in that the drive surfaces (6) of the inner driving profile (5) are inclined relative to the profile axis (P_a) by an angle of inclination α_I which is at least 1° , in particular at least 1,5° and/or in that the drive surfaces (6) of the inner driving profile (5) are inclined relative to the profile axis (P_I) by an angle of inclination α_I of at most 5° , in particular at most 3.5° and preferably at most 3° , the angle of inclination α_I preferably being 2° ± 0.2° or 3° ± 0.2° .

6. Drive element according to claim 4 or 5, **characterized in** that the transition surfaces (7) are inclined with respect to the profile axis (P_I) and approach the profile axis (P_I) starting from an insertion opening (5a) of the inner driving profile (5) towards the rear end of the inner driving profile (5).

7. Drive element according to claim 6, **characterized** in that the transition surfaces (7) are inclined relative to the profile axis (P_I) by an angle of inclination β_I which is at least 1° , in particular at least 1,5° and/or in that the transition surfaces (7) of the inner driving profile (5) are inclined relative to the profile axis (P_I) by an angle of inclination β_I of at most 5° , in particular at most 3.5° and preferably at most 3° , the angle of inclination β_I preferably being 2° ± 0.2° or 3° ± 0.2° .

8. Drive element according to claim 6 or 7, **characterized in** that the angle of inclination α_I of the drive surfaces (6) relative to the profile axis (P_I) is as large as the angle of inclination β_I of the transition surfaces (7) relative to the profile axis (P_I).

9. Drive element according to one of the preceding claims, **characterized in** that it has an outer driving profile (9) and the drive surfaces (10) of the outer driving profile (9) are inclined with respect to the profile axis (P_A), approaching the profile axis (P_A) towards an insertion end of the outer driving profile (9).

10. Drive element according to claim 9, **characterized** in that the drive surfaces (10) are inclined with respect to the profile axis (P_A) by an angle of inclination α_A, which is at least 0.5° , in particular at least 1° and/or is at most 1.5° , the angle of inclination α_A preferably being 1.15° ± 0.2° .

11. Drive element according to claim 9 or 10, **characterized in** that the transition surfaces (7a) are inclined with respect to the profile axis (P_A) at an angle of inclination β_A which is greater than 0° and less than 0.7° and is preferably 0.4° ± 0.05° .

12. Drive element according to claim 11, **characterized** in that the angle of inclination β_A of the transition surfaces (7a) relative to the profile axis (P_A) is

smaller than the angle of inclination α_A of the drive surfaces (10) relative to the profile axis (P_A), the ratio of the angle of inclination α_A to the angle of inclination β_A being ≥ 2, in particular ≥ 2.5, and preferably being 2.8 ± 0.2.

13. Drive element according to one of the previous claims, **characterized in** that the outer diameter (D_A) is constant over the axial length of the driving profile (5, 9).

14. Drive element according to one of the previous claims, **characterized in** that the inner diameter (D_I) over the axial length of the driving profile (5, 9) is constant or increases continuously in adaptation to an inclination of the transition surfaces (7, 7a) with respect to the respective profile axis (P_I, P_A) in the case of an inner driving profile (5) in the direction of its insertion opening (5a) and in the case of an outer driving profile (9) starting from its insertion end.

15. Drive element according to any one of the preceding claims, **characterized in** that the driving profile (5, 9) has five or six drive surfaces (6, 10).

16. Drive element according to one of the previous claims, **characterized in** that the drive element (1) is a screw and the driving profile (5) is formed on the screw head (4).

17. Drive element according to any one of claims 1 to 16, **characterized in** that the drive element (8) is a screw bit.

18. Method for connecting two components, in particular a screw (1) and a rotary tool (8), in a rotationally fixed manner, one of the components being designed as a drive element (8) with an outer driving profile (5, 9) and the other component being designed as a drive element (1) with an inner

driving profile (5), in which the driving profiles (5, 9) of the two components (1, 8) are plugged together axially in order to produce a rotationally fixed connection between the two components (1, 8), **characterized** in that the components are designed as drive elements (1, 8) according to one of the previous claims and the driving profiles (5, 9) of the drive elements (1, 8) are selected to be complementary to one another in such a way that the drive surfaces (6, 10) of the components (1, 8) come into contact with one another in a 2-dimensional manner when the driving profiles (5, 9) are axially plugged together, so that a frictional and/or clamping connection, via which the components (1, 8) are axially connected to one another, is produced between the components (1, 8).

19. Method according to claim 18, **characterized in that** the driving profiles (5, 9) of the two components (1, 8) have drive surfaces (6, 10) inclined to their respective profile axis (P_I, P_A).

20. Method for the rotationally fixed connection of second components according to claim 19, **characterized** in that the angle of inclination α_i, by which the drive surfaces (6) of the inner driving profile (5) are inclined with respect to the profile axis (P_I), is greater than the angle of inclination α_A, by which the drive surfaces (6) of the outer driving profile (10) are inclined with respect to the profile axis (P_A).

21. Method for the rotationally fixed connection of second components according to claim 20, **characterized** in that the angle of inclination α_i of the drive surfaces (6) of the inner driving profile (5) is $3° \pm 0.2°$ and the angle of inclination α_A of the drive surfaces (10) of the outer driving profile (6) with respect to the profile axis (P_B) is $1{,}15° \pm 0.15°$, or that the angle of inclination α_i of the drive surfaces (6) of the inner driving profile (5) relative to the profile axis (P_I) is $2° \pm 0.2°$ and the angle of inclination α_A of the

drive surfaces (10) of the outer driving profile (6) relative to the profile axis (P_A) is 1.15° ± 0.15° .

22. Method for the rotationally fixed connection of two components according to one of claims 18 to 21, **characterized** in that the transition surfaces (7, 7a) of the driving profiles (5, 9) of the two components (1, 8) are inclined with respect to the respective profile axis (P_I, P_A), wherein the angle of inclination β_i of the transition surfaces (7) of the inner driving profile (5) relative to the profile axis (P_I) to the angle of inclination (β_A) by which the transition surfaces (7a) of the outer driving profile (9) are inclined relative to the profile axis (P_I) is ≥ 5, in particular ≥ 6 and preferably ≥ 7.5.

23. method according to one of claims 18 to 22, **characterized in** that drive elements (1, 8) are used in which the outer diameter (D_a) of the inner driving profile (5) is smaller, in particular by 1.5 - 3% and preferably by 2% smaller, than the outer diameter (D_a) of the outer driving profile (6).

24. Method according to one of claims 18 to 23, **characterized in that** the drive surfaces (6, 10) of the two components come into surface contact with one another over at least 25%, in particular at least 40% and preferably at least 60% of their extent in the circumferential direction.

25. Method according to one of claims 18 to 24, **characterized in that the** two components come into contact with each contact surface (6, 10) on both sides of the longitudinal center plane thereof.

26. Method according to one of claims 18 to 25, **characterized in that** the driving profiles (5, 9) are designed in such a way that they do not come into contact in the region of the transition surfaces (7, 7a).